

PATENT COOPERATION TREATY


PCT

REC'D 18 DEC 2001

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

12

Applicant's or agent's file reference 45419-pt		FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/CA00/01096	International filing date (day/month/year) 21/09/2000	Priority date (day/month/year) 22/09/1999	
International Patent Classification (IPC) or national classification and IPC C12N15/82			
Applicant NATIONAL RESEARCH COUNCIL OF CANADA et al.			
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p><input type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of sheets.</p>			
<p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> I <input checked="" type="checkbox"/> Basis of the report II <input type="checkbox"/> Priority III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability IV <input type="checkbox"/> Lack of unity of invention V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement VI <input type="checkbox"/> Certain documents cited VII <input type="checkbox"/> Certain defects in the international application VIII <input checked="" type="checkbox"/> Certain observations on the international application 			
Date of submission of the demand 20/04/2001		Date of completion of this report 14.12.2001	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized officer Kania, T Telephone No. +49 89 2399 7703	



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/CA00/01096

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-20 as originally filed

Claims, No.:

1-39 as originally filed

Drawings, sheets:

1/8-8/8 as originally filed

Sequence listing part of the description, pages:

1/5-5/5, as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☒ contained in the international application in written form.
- ☒ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☒ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/CA00/01096

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-39
	No:	Claims	
Inventive step (IS)	Yes:	Claims	3-6,12-15,21-24,31-34
	No:	Claims	1,2,7-11,16-20,25-30,35-39
Industrial applicability (IA)	Yes:	Claims	1-39
	No:	Claims	

2. Citations and explanations
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/CA00/01096

The present report refers to the documents cited in the search report.

The document numbering (D1-D10) corresponds to their order of citation in the search report.

Section V (novelty and inventive step, Art. 33 PCT)

1. The present application achieves the creation of transgenic plants having a modified fatty acid profile and an increased salt tolerance. The plants recombinantly express an *E. coli* mutant gene encoding glycerol-3-phosphate dehydrogenase, called gpsA2FR herein. The mutant enzyme is less sensitive to feedback inhibition by the reaction product glycerol-3-phosphate (G-3-P) which leads to an increased enzymatic activity in transgenic plants.

2. Independent claims 19 and 29 relate to methods for the expression of heterologous glycerol-3-phosphate dehydrogenase (G-3-P dehydrogenase) in transgenic plants, as well as to the plants created, with the objective to modify fatty acid content or stress tolerance of said plants. The methods are characterized by the use of an enzyme that is "less sensitive to feedback inhibition".

Cited document D1 describes the cloning of a G-3-P dehydrogenase from *Cuphea lanceolata*. The use of this sequence for the heterologous expression in transgenic oil plants in order to modify lipid metabolism is suggested (see pages 12/13, claim 11). Cited document D2 characterizes different isoforms of G-3-P dehydrogenase from the alga *Dunaliella*. A so-called osmoregulator isoform is identified and suggested to be used for the improvement of osmoregulation with glycerol in transgenic plants (see page 249).

In the light of these documents the problem underlying said claims is the replacement of these enzymes by an alternative enzyme. The solution to choose an enzyme that is less sensitive to feedback inhibition can be regarded as obvious in the light of cited documents D5 and D6, that disclose G-3-P dehydrogenase from *E. coli* as well as its mutant isoform which is less sensitive to feedback inhibition.

Thus, claims 19 and 29 in their present form are regarded as **not inventive (Art.33(3)PCT)**.

The same applies for the even more general claims 1 and 10 as well as dependent

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/CA00/01096

claims 2, 7-9, 11, 16-18, 20, 25-28, 30, 35-38. The use of a mutant enzyme or the selection of host plants are not considered as special technical features that could be regarded as establishing a contribution over the prior art, i.e. an inventive concept.

3. The vector of claim 39 is merely characterized by a result to be achieved. The only characterizing feature of this vector is the DNA encoding a G-3-P dehydrogenase. Such a vector is suggested in D1 and D2.

Consequently, claim 39 is **not inventive (Art. 33(3) PCT)**.

4. For the the successful use of the specific sequences of SEQ ID NO:1,2 cloned in the present application, novelty and inventive activity can be acknowledged.

Section VIII (clarity, Art. 6 PCT)

5. The term "gpsA2FR" used in some of the claims does not readily define the claimed subject-matter. It was read, however, in the sense of the application as a synonym for the glycerol-3-phosphate encoding sequences of SEQ ID NO:1 and 2.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 45419-pt	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/CA 00/ 01096	International filing date (<i>day/month/year</i>) 21/09/2000	(Earliest) Priority Date (<i>day/month/year</i>) 22/09/1999
Applicant NATIONAL RESEARCH COUNCIL OF CANADA		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 4 sheets.
☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).
- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :
- ☒ contained in the international application in written form.
- ☒ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

- ☒ the text is approved as submitted by the applicant.
- ☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

- ☒ the text is approved as submitted by the applicant.
- ☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

- ☐ as suggested by the applicant.
- ☐ because the applicant failed to suggest a figure.
- ☐ because this figure better characterizes the invention.
- ☒ None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/CA 00/01096

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C12N15/82 C12N15/53 A01H5/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C12N A01H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, BIOSIS, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 95 06733 A (MAX PLANCK GESELLSCHAFT ;SCHELL JOZEF (DE); HAUSMANN LUEDGER (DE);) 9 March 1995 (1995-03-09)	1-3, 7-12, 16-21, 25-28, 39
Y	the whole document	29-31, 35-38
Y	<p style="text-align: center;">---</p> <p>GEE ROBERT ET AL: "Two isoforms of dihydroxyacetone phosphate reductase from the chloroplasts of Dunaliella tertiolecta." PLANT PHYSIOLOGY (ROCKVILLE), vol. 103, no. 1, 1993, pages 243-249, XP002154757 ISSN: 0032-0889 page 249, left-hand column</p> <p style="text-align: center;">---</p>	29-31, 35-38

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *&* document member of the same patent family

Date of the actual completion of the international search

8 December 2000

Date of mailing of the international search report

22/12/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
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Fax: (+31-70) 340-3016

Authorized officer

Maddox, A

INTERNATIONAL SEARCH REPORT

International Application No

PCT/CA 00/01096

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	HAUSMANN L ET AL: "CLONING OF A CDNA CODING FOR A GLYCEROL-3-PHOSPHATE DEHYDROGENASE FROM CUPHEA LANCEOLATA" PLANT LIPID METABOLISM, XX, XX, 1995, pages 534-536, XP000949817 the whole document ---	39
A	WO 99 28480 A (GENECOR INTERNATIONAL INC ;DU PONT (US); NAIR RAMESH V (US); PAYNE) 10 June 1999 (1999-06-10) the whole document ---	1-39
A	CLARK D ET AL: "REGULATION OF PHOSPHO LIPID BIOSYNTHESIS IN ESCHERICHIA-COLI CLONING OF THE STRUCTURAL GENE FOR THE BIOSYNTHETIC SN GLYCEROL 3 PHOSPHATE DEHYDROGENASE EC-1.1.1.8" JOURNAL OF BIOLOGICAL CHEMISTRY, vol. 255, no. 2, 1980, pages 714-717, XP002154728 ISSN: 0021-9258 the whole document ---	1-39
A	EDGAR J R ET AL: "BIOSYNTHESIS IN ESCHERICHIA-COLI OF SN GLYCEROL 3 PHOSPHATE A PRECURSOR OF PHOSPHO LIPID PURIFICATION AND PHYSICAL CHARACTERIZATION OF WILD TYPE AND FEEDBACK RESISTANT FORMS OF THE BIOSYNTHETIC SN GLYCEROL 3 PHOSPHATE DEHYDROGENASE EC-1.1.1.8" JOURNAL OF BIOLOGICAL CHEMISTRY, vol. 253, no. 18, 1978, pages 6348-6353, XP002154729 EN ISSN: 0021-9258 the whole document ---	1-39
A	LARSSON K ET AL: "A GENE ENCODING SN-GLYCEROL 3-PHOSPHATE DEHYDROGENASE (NAD+) COMPLEMENTS AN OSMOSENSITIVE MUTANT OF SACCHAROMYCES CEREVISIAE" MOLECULAR MICROBIOLOGY, GB, BLACKWELL SCIENTIFIC, OXFORD, vol. 10, no. 5, 1993, pages 1101-1111, XP000562759 ISSN: 0950-382X the whole document ---	29-38
A	WO 96 38573 A (CANADA NAT RES COUNCIL ;ZOU JITAO (CA); TAYLOR DAVID C (CA); KATAV) 5 December 1996 (1996-12-05) the whole document --- -/--	19-28

INTERNATIONAL SEARCH REPORT

International Application No
PCT/CA 00/01096

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 843 007 A (KIRIN BREWERY) 20 May 1998 (1998-05-20) page 12	19-38
A	WO 92 13082 A (KIRIN BREWERY) 6 August 1992 (1992-08-06) the whole document	19-38

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/CA 00/01096

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9506733	A	09-03-1995	AU 680551 B	31-07-1997
			AU 7693894 A	22-03-1995
			CA 2170611 A	09-03-1995
			EP 0716699 A	19-06-1996
			US 6103520 A	15-08-2000
WO 9928480	A	10-06-1999	AU 1619199 A	16-06-1999
			BR 9815361 A	21-11-2000
			EP 1034278 A	13-09-2000
WO 9638573	A	05-12-1996	AU 706507 B	17-06-1999
			AU 5807196 A	18-12-1996
			BR 9608693 A	07-12-1999
			CA 2224470 A	05-12-1996
			EP 0832262 A	01-04-1998
			JP 11506323 T	08-06-1999
			PL 323784 A	27-04-1998
			US 6051755 A	18-04-2000
EP 0843007	A	20-05-1998	AU 706899 B	01-07-1999
			AU 6318296 A	26-02-1997
			CA 2227864 A	13-02-1997
			CN 1196085 A	14-10-1998
			WO 9705246 A	13-02-1997
WO 9213082	A	06-08-1992	AU 1163392 A	27-08-1992
			CA 2100674 A	17-07-1992
			DE 69207749 D	29-02-1996
			DE 69207749 T	13-06-1996
			DK 567648 T	04-03-1996
			EP 0567648 A	03-11-1993
			ES 2083732 T	16-04-1996
			JP 6504439 T	26-05-1994
			US 5516667 A	14-05-1996
			KR 191015 B	15-06-1999

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
US Department of Commerce
United States Patent and Trademark
Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE
in its capacity as elected Office

Date of mailing (day/month/year) 15 June 2001 (15.06.01)	Applicant's or agent's file reference 45419-PT
International application No. PCT/CA00/01096	
International filing date (day/month/year) 21 September 2000 (21.09.00)	Priority date (day/month/year) 22 September 1999 (22.09.99)
Applicant ZOU, Jitao et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:
20 April 2001 (20.04.01)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Odile ALIU Telephone No.: (41-22) 338.83.38
---	--

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT
OR THE DECLARATION

(PCT Rule 44.1)

To:

KIRBY EADES GALE BAKER
Attn. BAUER-MOORE, Andrew
Box 3432, Station D
Ottawa, Ontario K1P 6N9
CANADA

Date of mailing
(day/month/year)

22/12/2000

Applicant's or agent's file reference

45419-pt

FOR FURTHER ACTION

See paragraphs 1 and 4 below

International application No.

PCT/CA 00/01096

International filing date
(day/month/year)

21/09/2000

Applicant

NATIONAL RESEARCH COUNCIL OF CANADA

1. ☒ The applicant is hereby notified that the International Search Report has been established and is transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

When? The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report; however, for more details, see the notes on the accompanying sheet.

Where? Directly to the International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland
Facsimile No.: (41-22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no International Search Report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.

3. ☐ **With regard to the protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Further action(s):** The applicant is reminded of the following:

Shortly after 18 months from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

Within 19 months from the priority date, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).

Within 20 months from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

Name and mailing address of the International Searching Authority



European Patent Office, P.B. 5818 Patentlaan 2
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Authorized officer

Mireille Claudepierre

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
29 March 2001 (29.03.2001)

PCT

(10) International Publication Number
WO 01/21820 A1

(51) International Patent Classification⁷: C12N 15/82,
15/53, A01H 5/00

(21) International Application Number: PCT/CA00/01096

(22) International Filing Date:
21 September 2000 (21.09.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/155,133 22 September 1999 (22.09.1999) US

(63) Related by continuation (CON) or continuation-in-part
(CIP) to earlier application:
US 60/155,133 (CON)
Filed on 22 September 1999 (22.09.1999)

(71) Applicant (for all designated States except US): NA-
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(72) Inventors; and

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PERIAPPURAM, Cyril [CA/CA]; 101-536 4th Av-
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SELVARAJ, Gopalan [CA/CA]; 540 Nesslin Crescent,
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[CA/CA]; 422 Tennant Way, Saskatoon, Saskatchewan
S7H 5C4 (CA).

(74) Agents: BAUER-MOORE, Andrew et al.; Kirby, Eades,
Gale, Baker, P.O. Box 3432, Station D, Ottawa, Ontario
K1P 6N9 (CA).

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU,
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ,
DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR,
HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR,
LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ,
NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM,
TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States (*regional*): ARIPO patent (GH, GM,
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian
patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European
patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE,
IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG,
CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:

- With international search report.
- With (an) indication(s) in relation to deposited biological material furnished under Rule 13bis separately from the description.

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: TRANSGENIC MANIPULATION OF SN-GLYCEROL-3-PHOSPHATE AND GLYCEROL PRODUCTION WITH A FEEDBACK DEFECTIVE GLYCEROL-3-PHOSPHATE DEHYDROGENASE GENE

(57) Abstract: The invention provides a method for genetically transforming a plant so that it expresses a glycerol-3-phosphate dehydrogenase that is feed-back defective. The feed-back defective enzyme raises levels of glycerol and glycerol-3-phosphate in comparison to the wild type, leading to increased osmotic stress tolerance, and altered fatty acid content in glycerolipids.

WO 01/21820 A1

PCT

Original (for SUBMISSION) - printed on 21.09.2000 03:30:59 PM

45419-PT

0-1	Form - PCT/RO/134 (EASY) Indications Relating to Deposited Microorganism(s) or Other Biological Material (PCT Rule 13bis)	
0-1-1	Prepared using	PCT-EASY Version 2.91 (updated 01.07.2000)
0-2	International Application No.	PCT/CA 00/01096
0-3	Applicant's or agent's file reference	45419-PT
1	The indications made below relate to the deposited microorganism(s) or other biological material referred to in the description on:	
1-1	page	10
1-2	line	27
1-3	Identification of Deposit	
1-3-1	Name of depositary institution	American Type Culture Collection
1-3-2	Address of depositary institution	10801 University Blvd., Manassas, Virginia 20110-2209 United States of America
1-3-3	Date of deposit	31 August 2000 (31.08.2000)
1-3-4	Accession Number	ATCC 2433
1-4	Additional Indications	NONE
1-5	Designated States for Which Indications are Made	all designated States
1-6	Separate Furnishing of Indications	NONE
	These indications will be submitted to the International Bureau later	

FOR RECEIVING OFFICE USE ONLY

0-4	This form was received with the international application: (yes or no)	yes
0-4-1	Authorized officer	Carole Millain

FOR INTERNATIONAL BUREAU USE ONLY

0-5	This form was received by the International Bureau on:	
0-5-1	Authorized officer	

INTERNATIONAL SEARCH REPORT

International Application No
PCT/CA 00/01096

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 C12N15/82 C12N15/53 A01H5/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 C12N A01H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, BIOSIS, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 95 06733 A (MAX PLANCK GESELLSCHAFT ;SCHELL JOZEF (DE); HAUSMANN LUEDGER (DE);) 9 March 1995 (1995-03-09)	1-3, 7-12, 16-21, 25-28, 39 29-31, 35-38
Y	the whole document	
Y	<p style="text-align: center;">----</p> <p>GEE ROBERT ET AL: "Two isoforms of dihydroxyacetone phosphate reductase from the chloroplasts of Dunaliella tertiolecta." PLANT PHYSIOLOGY (ROCKVILLE), vol. 103, no. 1, 1993, pages 243-249, XP002154757 ISSN: 0032-0889 page 249, left-hand column</p> <p style="text-align: center;">----</p> <p style="text-align: center;">-/--</p>	29-31, 35-38

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

8 December 2000

Date of mailing of the international search report

22/12/2000

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Maddox, A

INTERNATIONAL SEARCH REPORT

Intern al Application No
PCT/CA 00/01096

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	HAUSMANN L ET AL: "CLONING OF A CDNA CODING FOR A GLYCEROL-3-PHOSPHATE DEHYDROGENASE FROM CUPHEA LANCEOLATA" PLANT LIPID METABOLISM, XX, XX, 1995, pages 534-536, XP000949817 the whole document	39
A	WO 99 28480 A (GENECOR INTERNATIONAL INC ;DU PONT (US); NAIR RAMESH V (US); PAYNE) 10 June 1999 (1999-06-10) the whole document	1-39
A	CLARK D ET AL: "REGULATION OF PHOSPHO LIPID BIOSYNTHESIS IN ESCHERICHIA-COLI CLONING OF THE STRUCTURAL GENE FOR THE BIOSYNTHETIC SN GLYCEROL 3 PHOSPHATE DEHYDROGENASE EC-1.1.1.8" JOURNAL OF BIOLOGICAL CHEMISTRY, vol. 255, no. 2, 1980, pages 714-717, XP002154728 ISSN: 0021-9258 the whole document	1-39
A	EDGAR J R ET AL: "BIOSYNTHESIS IN ESCHERICHIA-COLI OF SN GLYCEROL 3 PHOSPHATE A PRECURSOR OF PHOSPHO LIPID PURIFICATION AND PHYSICAL CHARACTERIZATION OF WILD TYPE AND FEEDBACK RESISTANT FORMS OF THE BIOSYNTHETIC SN GLYCEROL 3 PHOSPHATE DEHYDROGENASE EC-1.1.1.8" JOURNAL OF BIOLOGICAL CHEMISTRY, vol. 253, no. 18, 1978, pages 6348-6353, XP002154729 EN ISSN: 0021-9258 the whole document	1-39
A	LARSSON K ET AL: "A GENE ENCODING SN-GLYCEROL 3-PHOSPHATE DEHYDROGENASE (NAD+) COMPLEMENTS AN OSMOSENSITIVE MUTANT OF SACCHAROMYCES CEREVISIAE" MOLECULAR MICROBIOLOGY, GB, BLACKWELL SCIENTIFIC, OXFORD, vol. 10, no. 5, 1993, pages 1101-1111, XP000562759 ISSN: 0950-382X the whole document	29-38
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INTERNATIONAL SEARCH REPORT

Intern: Application No
PCT/CA 00/01096

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 843 007 A (KIRIN BREWERY) 20 May 1998 (1998-05-20) page 12 ---	19-38
A	WO 92 13082 A (KIRIN BREWERY) 6 August 1992 (1992-08-06) the whole document -----	19-38

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/CA 00/01096

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PATENT COOPERATION TREATY

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(day/month/year) 14.12.2001

Applicant's or agent's file reference
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21/09/2000

Priority date (day/month/year)
22/09/1999

Applicant
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1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
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